



# **wave 2.2**

**Service Manual**

## PPG WAVE 2.2 Adjusting instructions

The PPG WAVE 2.2 has fully digital tone-generators, which need no tuning at all. Because of the pitch-wheel which is an analog control there can be a total detuning of the instrument. Follow these instructions for getting proper function.

Open the instrument as follows:

Remove the two screws on both sides of the WAVE 2.2's case. Loosen the two screws at both posterior sides, which work as hinges. Lift the cover and remove the safety-plate of the printed circuit boards. Now the instrument is ready for service.

### 1. Adjusting the A/D Converter of the analog controls

Call up any program and have a look into the ANALOG DISPLAY. Move one control to the right-end position (full clockwise) and notice the corresponding analog value. A full clockwise turned control must show value "63". If not, you have to adjust the A/D Converter. The position of the A/D trim control is shown in picture 1. Adjust the A/D trim control to show value "63" even short before the end-position of the analog control. Make this adjustment before adjusting the Pitch Wheel (Bender).

### 2. Adjusting the Pitch Wheel

Call up any program that uses keyb.mode "0". Make sure that no detunings work on the oscillators (DETUN:0). Choose Bender Intensity BI:"3". In the way the Bender spreads from one limitation to the other, there are parts with no effect, called "windows". A "window", for example, is at the center position. The center position of the wheel should be in the middle of this window. It can be adjusted, by loosening the screw of the plastic wheel fixed on the potentiometer axis, and adjusting the center position of the wheel exactly to the centre of the window.

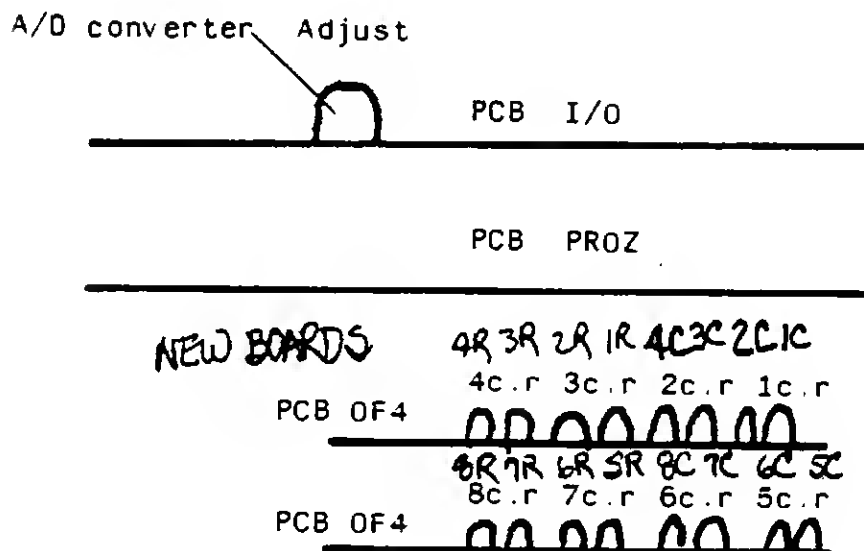
### 3. Adjusting the filters

#### 3.1. Adjusting the resonance intensity

The instrument is opened and power is on. Call up program 74 group A (original PPG program). Tune the instrument to 440 Hz (TTUNE: 440). Choose group A for adjusting the resonance. After power ON, the voices of the WAVE 2.2. are in the normal order. Each time you press a key, the next voice gets enabled. (in the sequence 1.2.3.4.5.6.7.8) Now press the first key, in the centre of the keyboard, and adjust the trim-pot so, that the filter resonance is directly before self-oscillation. Press the same key again and trim the next voice. Go through all the 8 voices this way. It is important that they are all trimmed to the same intensity.

#### 3.2. Adjusting the cutoff-frequency of the filters

Switth to group B (program 74). Press a key in the higher range of the keyboard, and adjust the cutoff-frequency so, that it becomes equal to the fundamental frequency of the tonegenerator. Do the same procedure for all the 8 voices. The positions of the trim-pot s you find in the drawing below.



1-8 voice number  
C cutoff trim  
R resonance trim

PCB: "MB" to "I/O Connector A

1	+12V
2	+12V
3	GND
4	GND
5	-12V
6	-12V
7	<u>B03X•B04X</u>
8	B02X
9	PB0 via Metronom push under
10	CB1 via Cassette Interface Clock
11	C2 Timer Dyn Sensor in
12	Ext start Sequencer
13	CA2 via Reset Sequencer
14	CV OUT - RES
15	Q-Clock
16	Pitch Wheel CV in
17	CV Out - VCF
18	CV Out - VCA
19	PB7 VIA Footswitch - Program
20	Mod Wheel CV In
21	C1 Timer Clock divider (1/3) In
22	O3 Timer Sequencer Clock
23	Ext CV In
24	CA1 PIA Sequencer Sync
25	PB5 VIA Trigger Out
26	GND CV In
27	CB2 VIA Cassetteinterface seriell DATA I/O
28	PB4 VIA Cassetteinterface enable
29	PB3 VIA Sustain
30	PB2 VIA Trigger In
31	GND CV In

# PCB "MB" to "I/O" Connector B

1	A 0	MPU-Adress Bus
2	A 1	"
3	A 2	"
4	A 3	"
5	A 4	"
6	A 5	"
7	A 6	"
8	A 7	"
9	A 8	"
10	A 9	"
11	A 10	"
12	A 11	"
13	A 12	"
14	A 13	"
15	A 14	"
16	A 15	"
17	D 0	Data Bus
18	D 1	"
19	D 2	"
20	D 3	"
21	D 4	"
22	D 5	"
23	D 6	"
24	D 7	"
25	FIRQ	
26	IRQ	
27	E (02)	
28	RES	
29	R/W	
30	+5V	
31	GND	

## PCB: "I/O" Connector S 4

1	LED Second Panel
2	GND
3	GND
4	LED "B"
5	Ext CV In
6	IC 76 Enable
7	IC 74/75/76 - A Bit
8	IC 74 Enable
9	IC 74/75/76 - C Bit
10	IC 74/75/76 - B Bit
11	IC 75 Enable
12	Pitch Wheel CV In
13	Mod Wheel CV In
14	+5V
15	LED "A"
16	Multiplexed CV OUT

PCB: "OF4" Connector A

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1	Reson. CV multiplexed
2	MPU Q-Clock
3	NC
4	NC
5	NC
6	VCF CV multiplexed
7	VCA CV multiplexed
8	D/A -B-Enable
9	D/A -A-Enable
10	D 0 MPU-Data
11	D 1 "
12	D 2 "
13	D 3 "
14	D 4 "
15	D 5 "
16	D 6 "
17	D 7 "
18	Data Latch (LS 379) =Multiplex-Switch-Controller Latch Enable Line
19	" " (LS 377) =CV - LAG - Controller Latch Enable Line
20	" " (LS 377) =CV - LAG - Controller Latch Enable Line

PCB: "OF4" Connector B

---

1	D/A Latch Clock -GND
2	Jackplus -VCF In
3	D/A -C-Enable
4	D/A -D-Enable
5	Audio-Out-D
6	" " -C
7	" " -A
8	Sound RAM Data
9	" "
10	" "
11	" "
12	" "
13	" "
14	" "
15	" "
16	Audio-Out -B
17	+12V
18	-12V
19	NC
20	+5V
21	GND =0V

PCB: "MB" to "PROZ" Connector A

---

1	A 0	MPU-Adress	Bus
2	A 1	"	"
3	A 2	"	"
4	A 3	"	"
5	A 4	"	"
6	O-Clock		
7	E 02x		
8	A e - MUX		
9	A 1 - "		
10	A 2 - "		
11	G MUX		
12	-		
13	-		
14	-		
15	-		
16	-		
17	D 0	MPU-Data-Bus	
18	D 1	"	"
19	D 2	"	"
20	D 3	"	"
21	D 4	"	"
22	D 5	"	"
23	D 6	"	"
24	D 7	"	"
25	IR0		
26	-		
27	E (02) Clock		
28	Restart		
29	r/W		
30	+5V		
31	GND		

PCB: "MB" to "PROZ" Connector

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1	N.C.		
2	D 0	Sound-Ram	-Data
3	D 1	"	"
4	D 2	"	"
5	D 3	"	"
6	D 4	"	"
7	D 5	"	"
8	D 6	"	"
9	D 7	"	"
10	N.C.		
11	N.C.		
12	+5V		
13	GND		

PCB "PROZ"

DON'T LOOSE TIME !

SEND THIS BOARD TO PPG

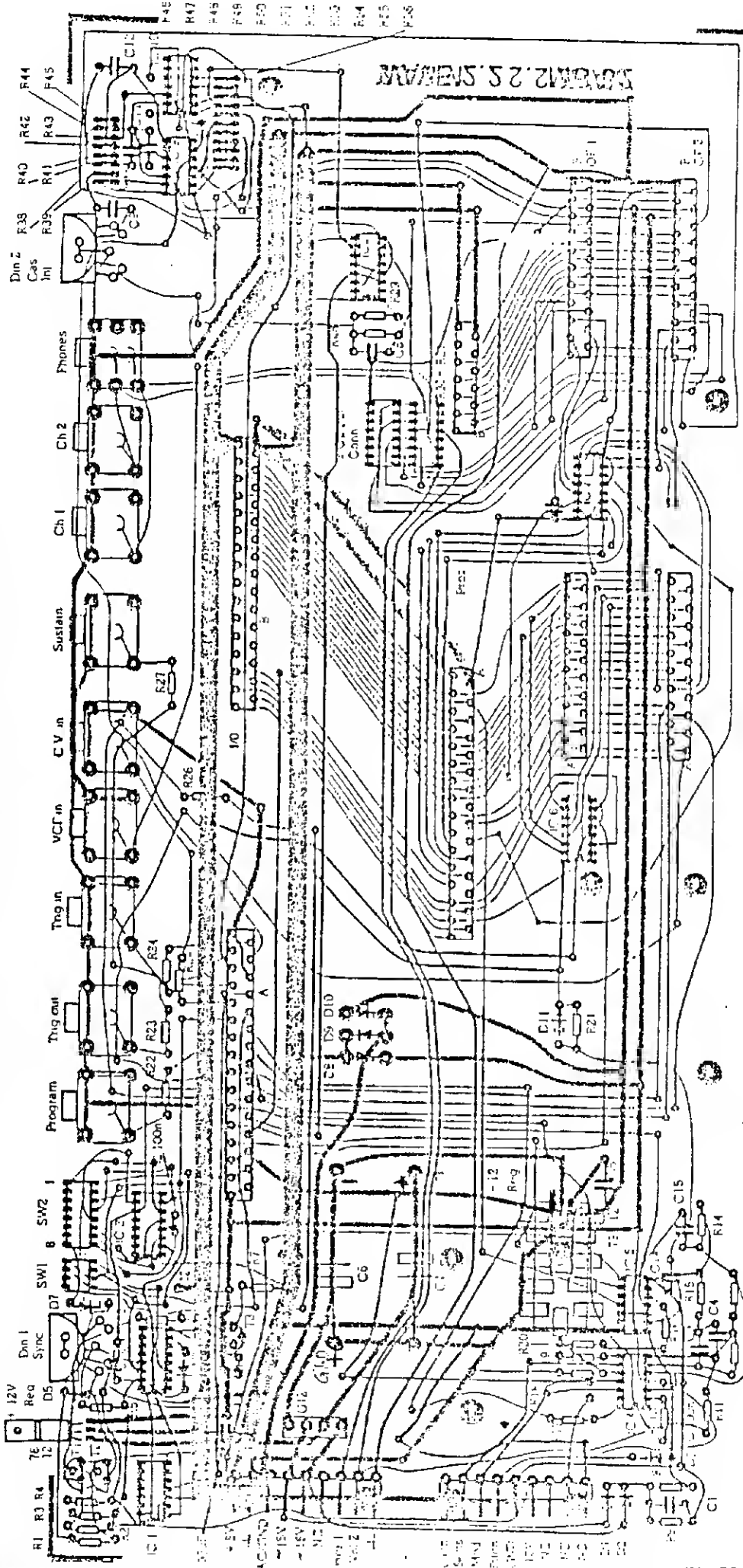
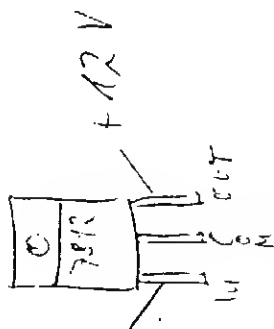
PPG-PALM INSTRUMENTS GMBH

WANDSBEKER CHAUSSEE 151  
D-2000 HAMBURG 76

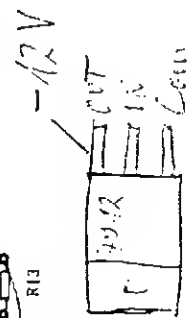


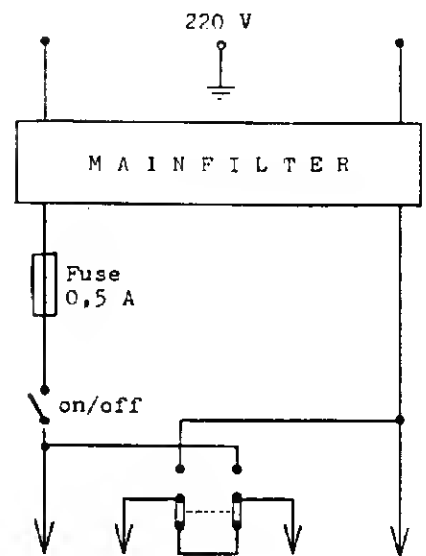
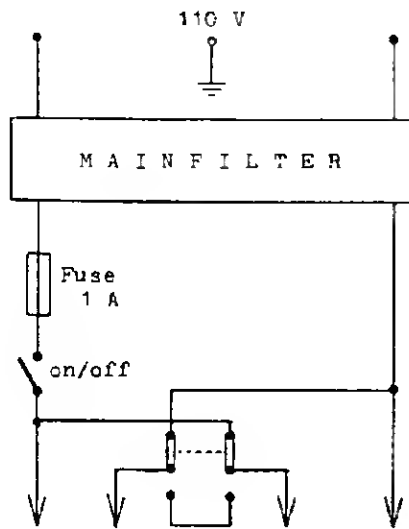
WAVE

# WAVE 2.3 MOTHER BOARD WAVE 2.2 MOTHER BOARD 82

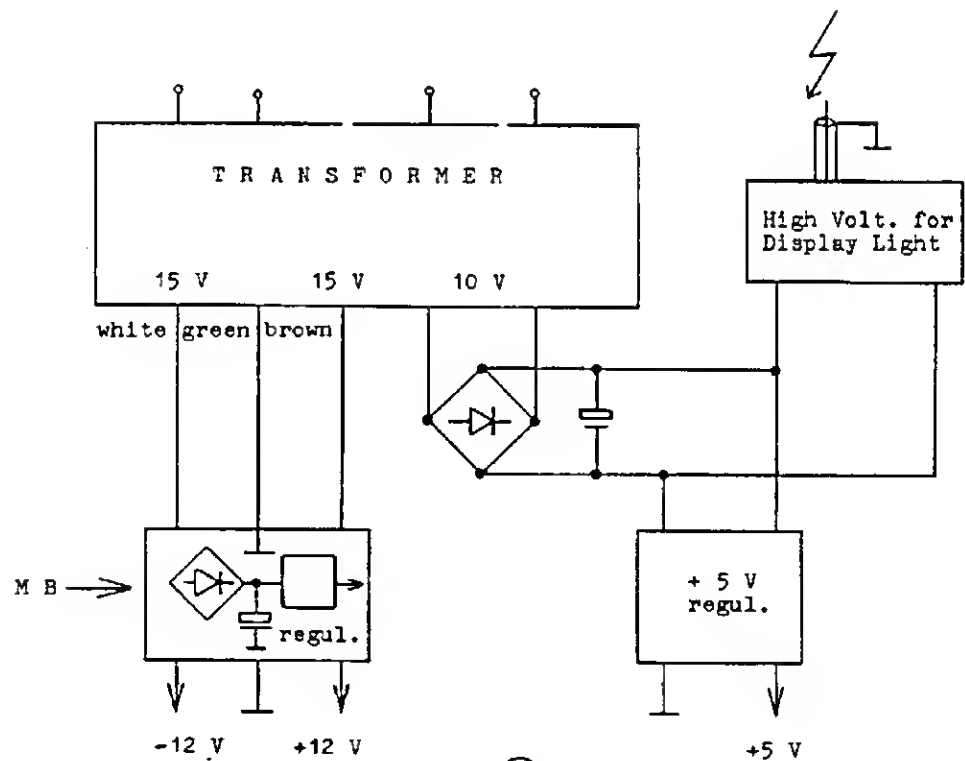


red circuit lines — solder side





*Handwritten notes:*  
 K  
 12  
 1



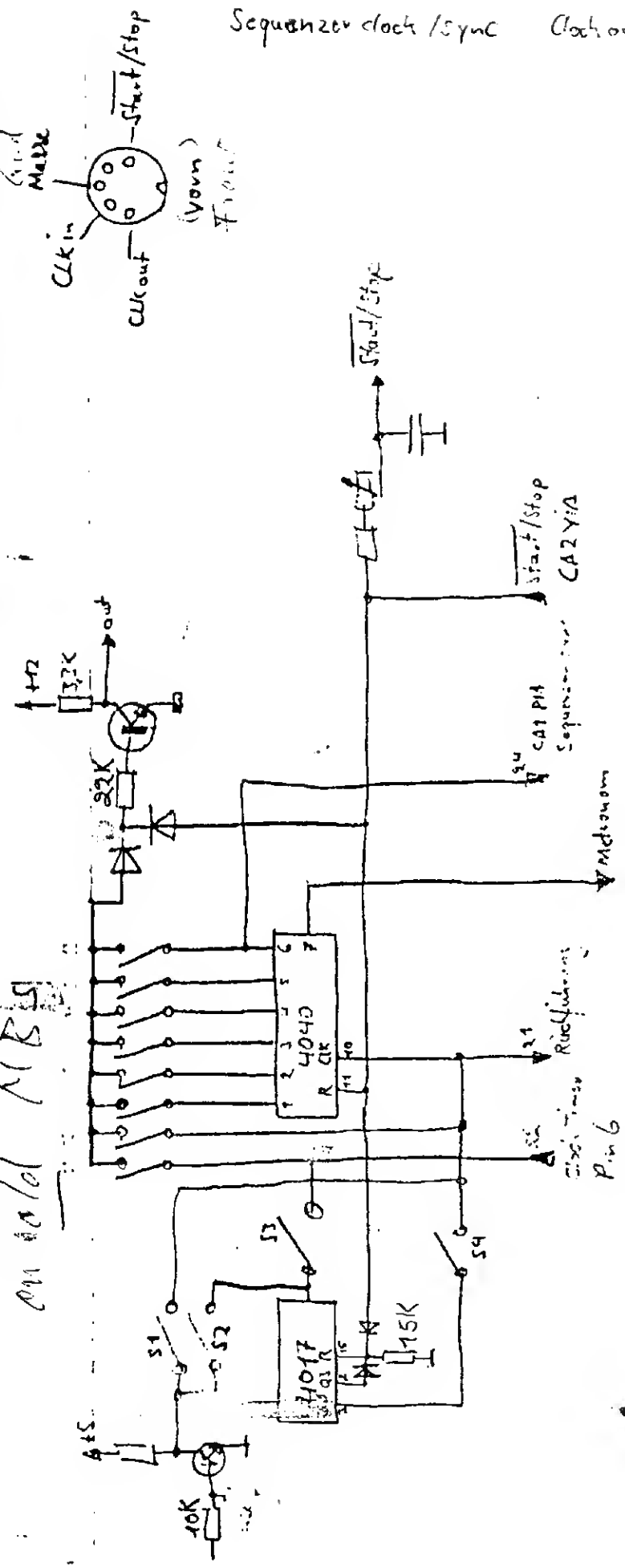
①

POWER SUPPLY

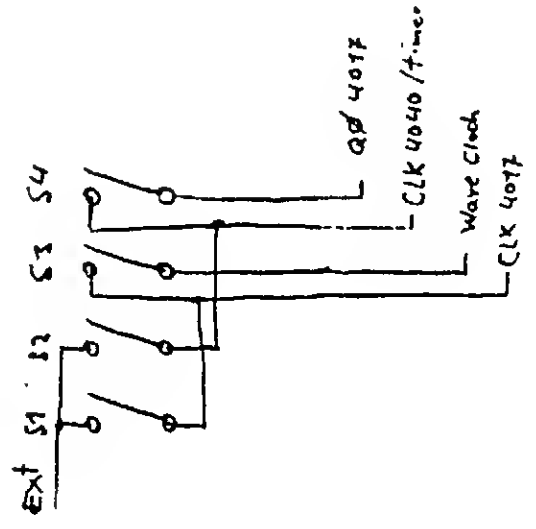
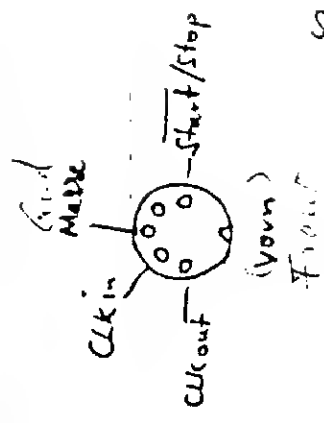


# 2.2 Seq. Clock In/Out. on old MBs

IN CASE OF THIS  
OLD ONE, CHECK MANUAL



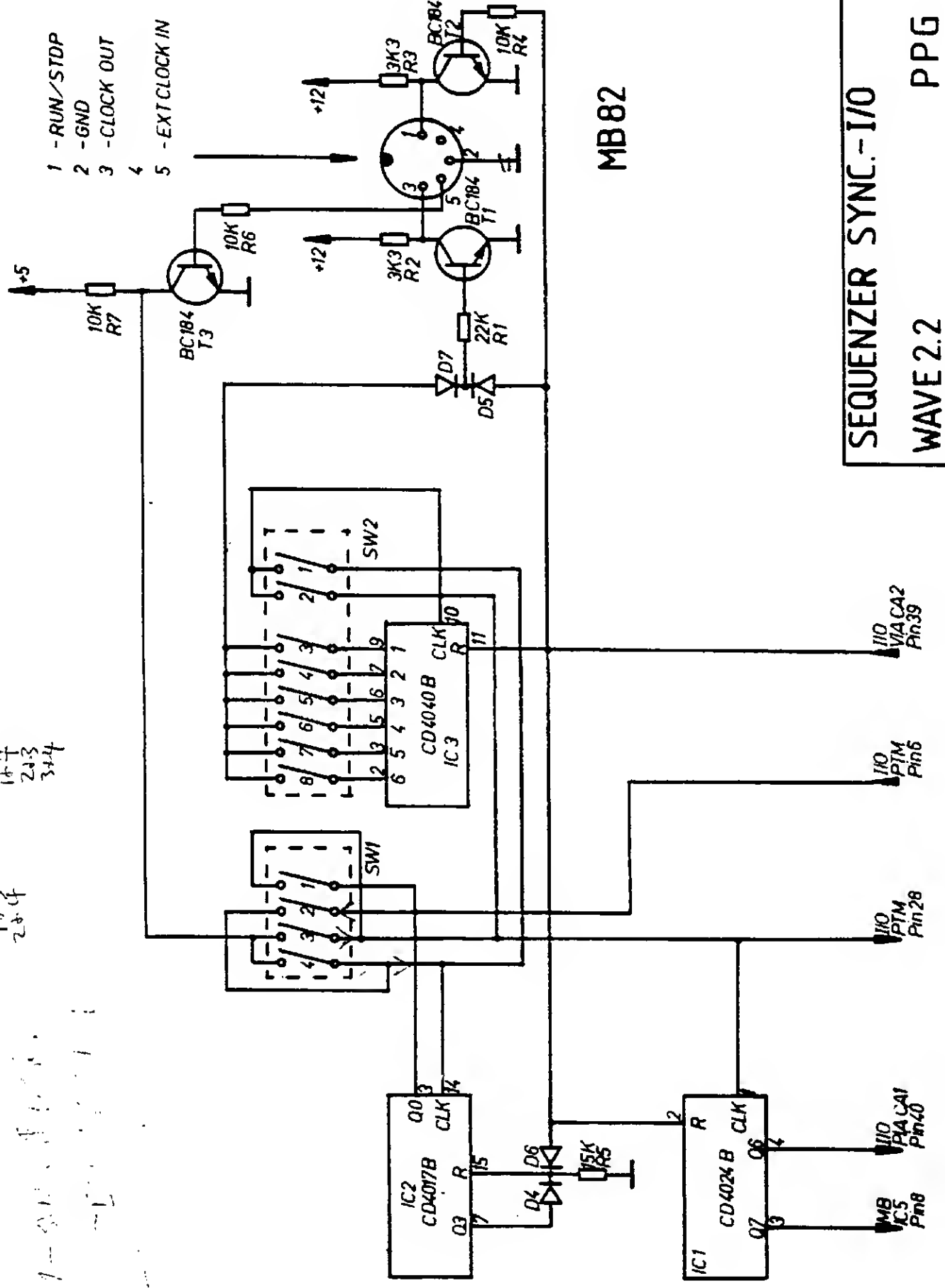
Sequencer clock / sync Clock out



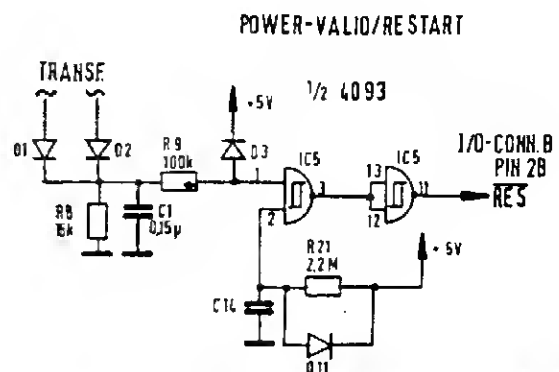
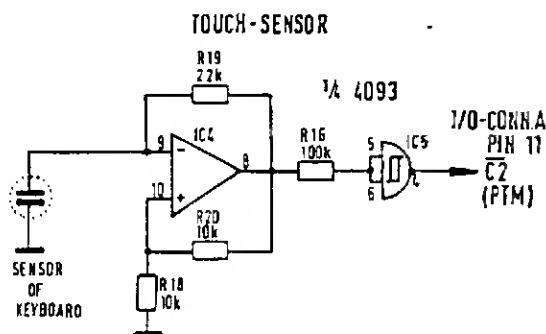
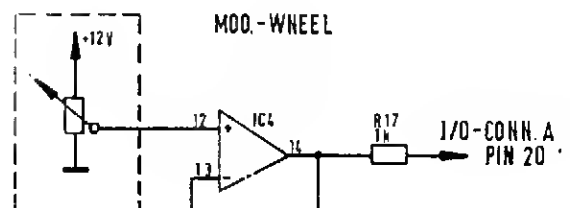
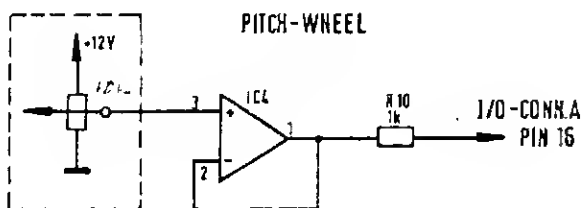
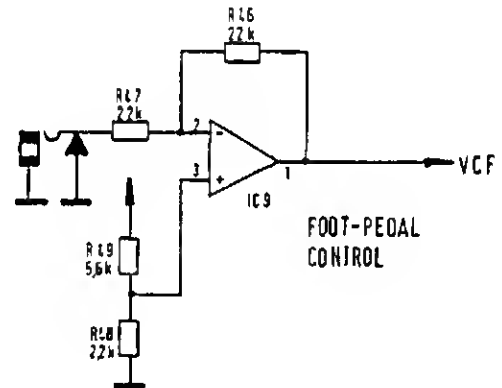
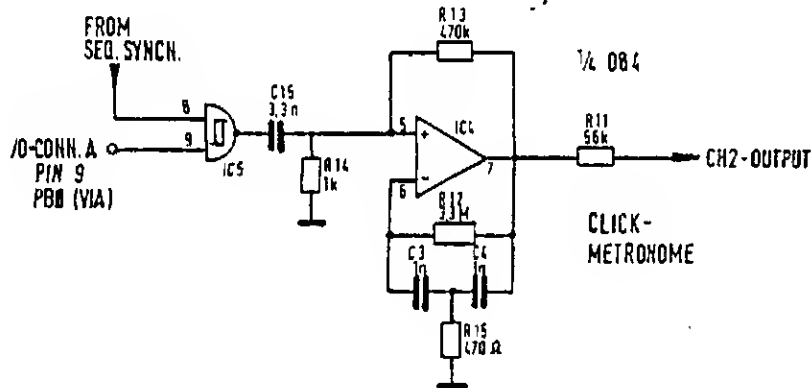
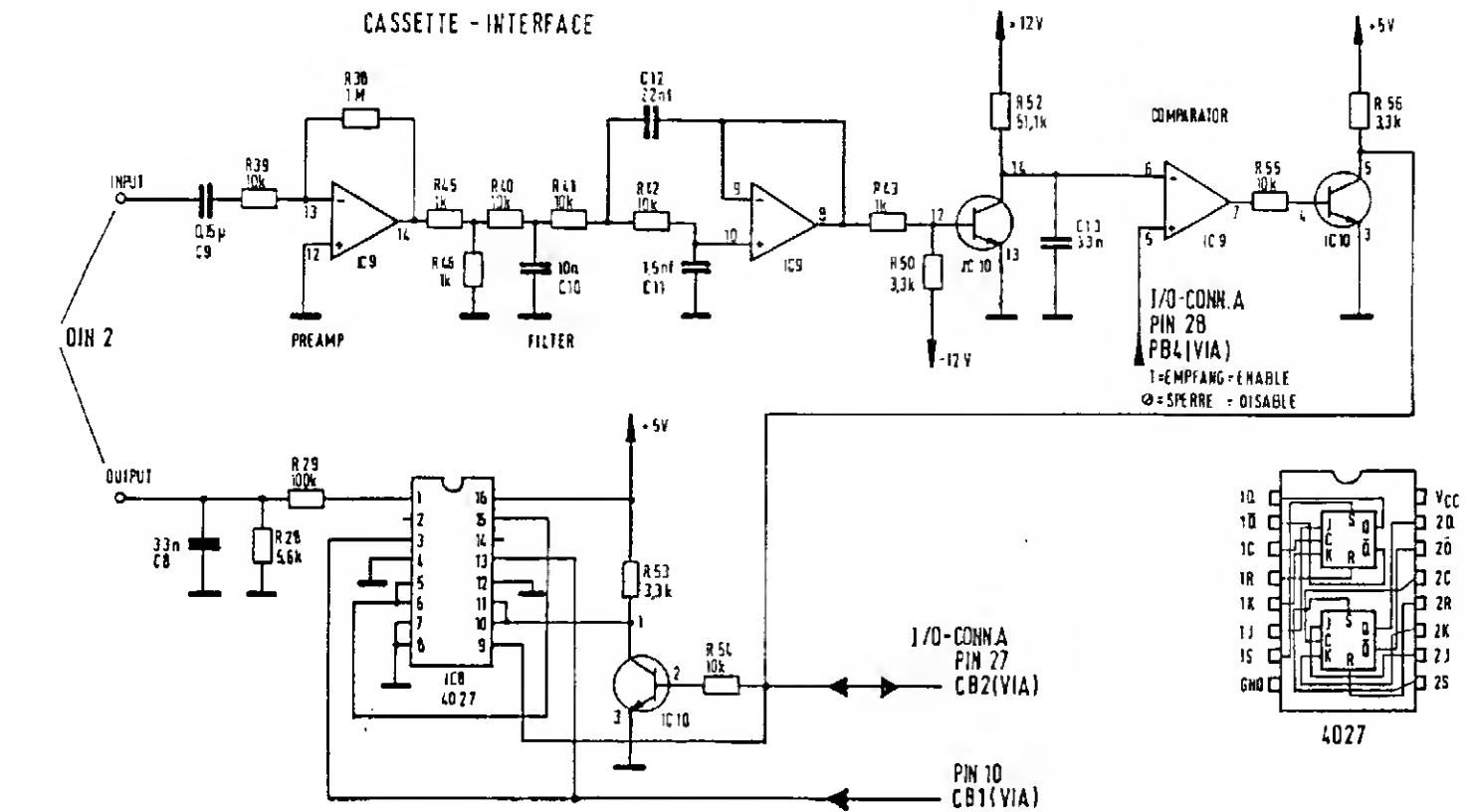
S4	S3	S2	S1	φ = off
1	1	0	0	1 = on
0	X	1	0	X = equal
1	0	0	1	

New MBs identical to Wave 2.3

14-3  
 14-4  
 24-3  
 34-4  
 14-3  
 14-4  
 24-3

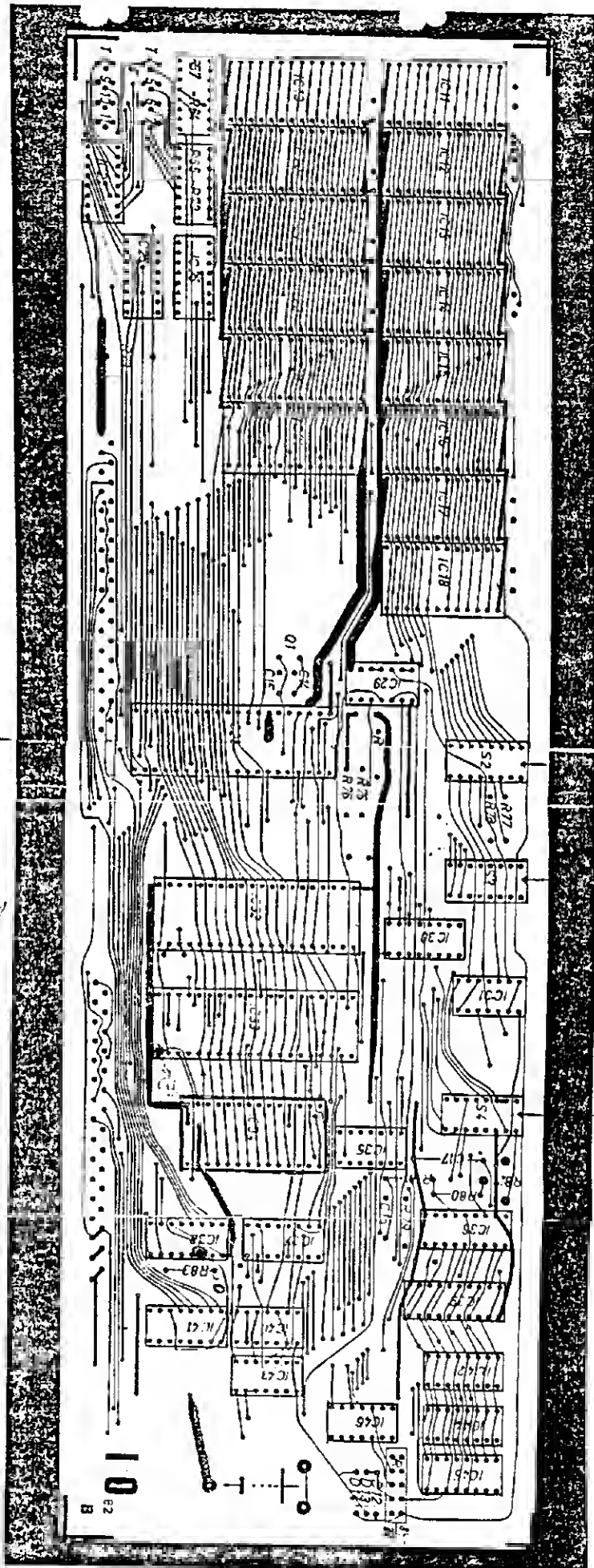


# CASSETTE - INTERFACE



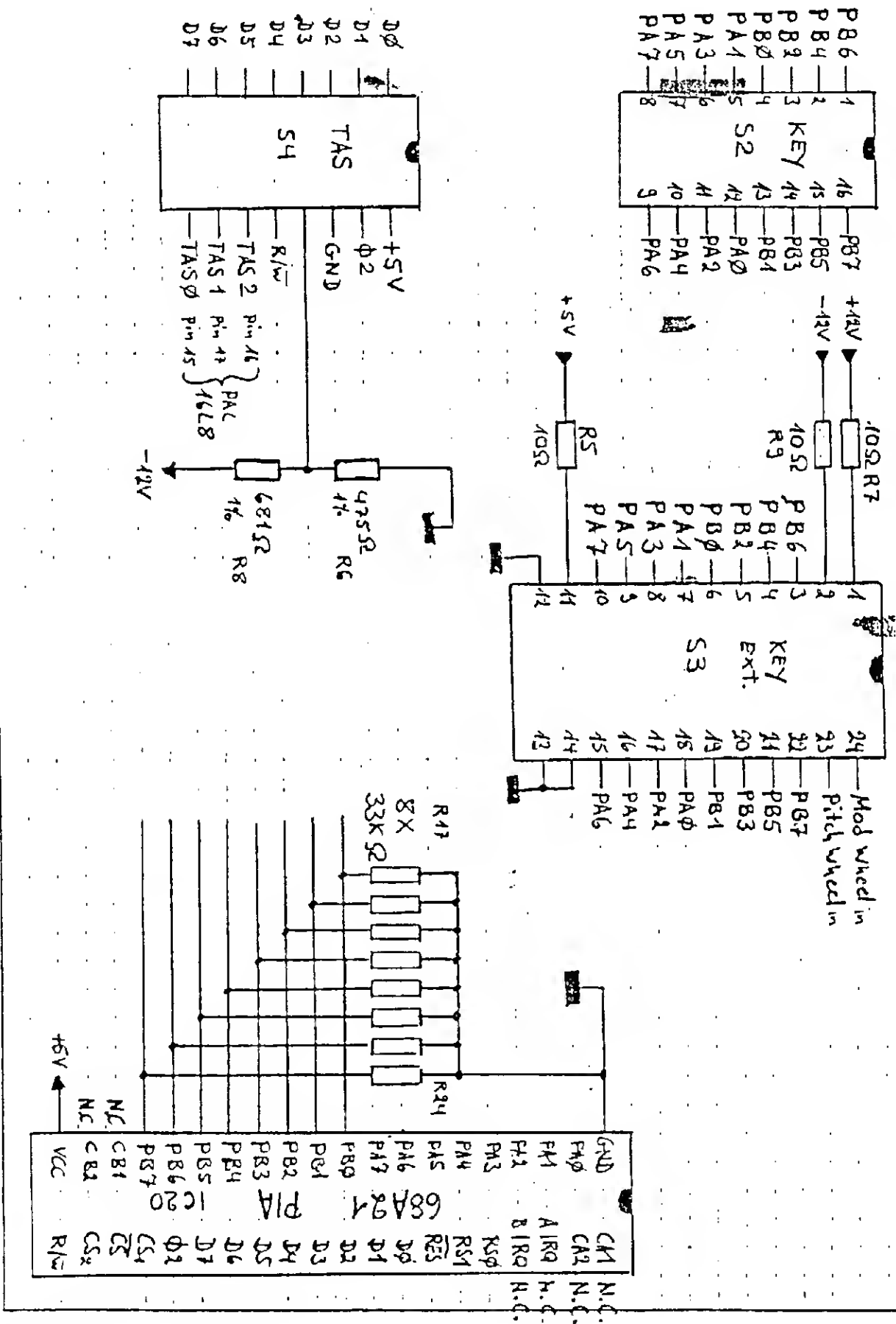


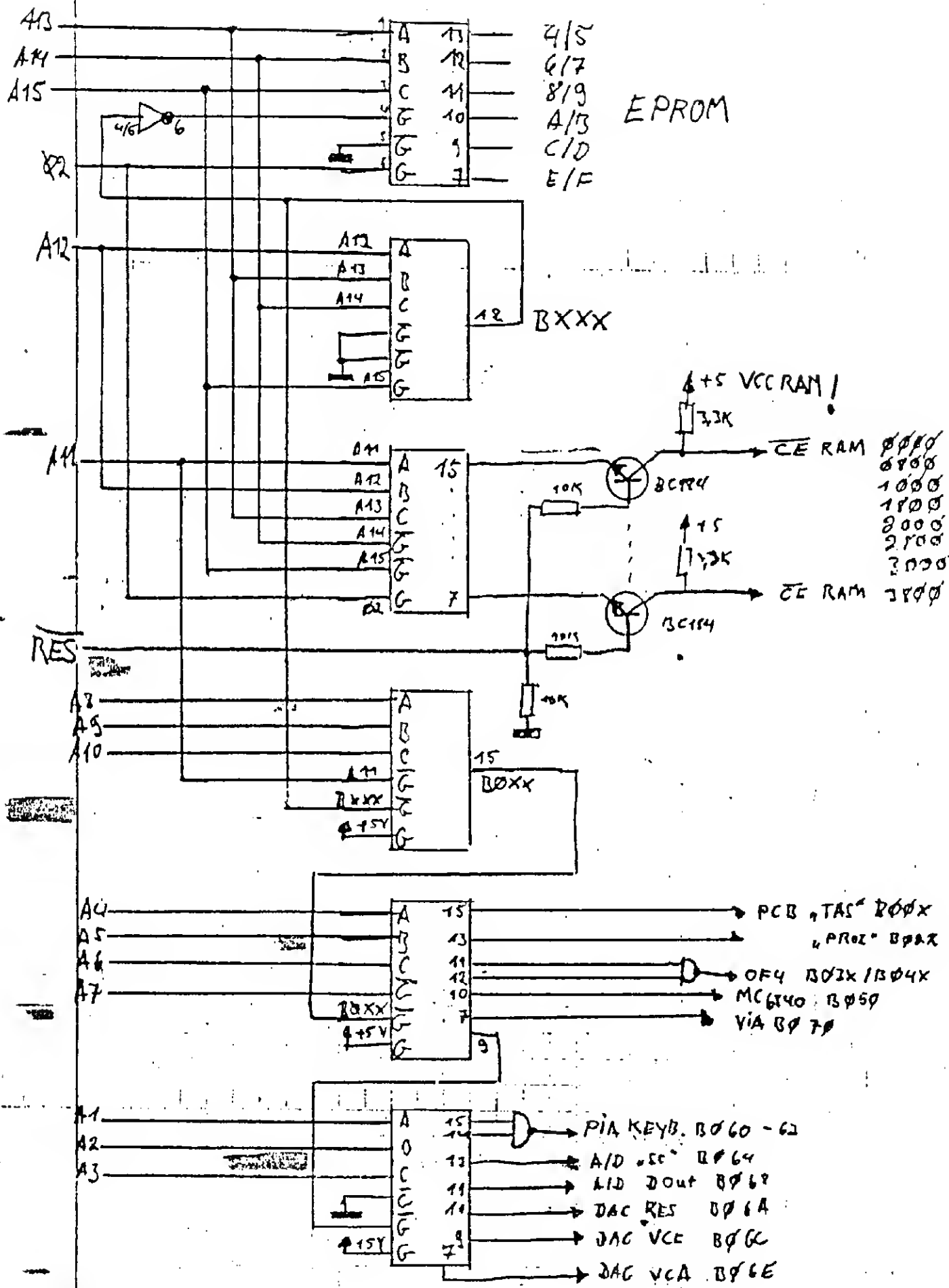
Have 2.2  
MIDI-Update  
1/c - Board

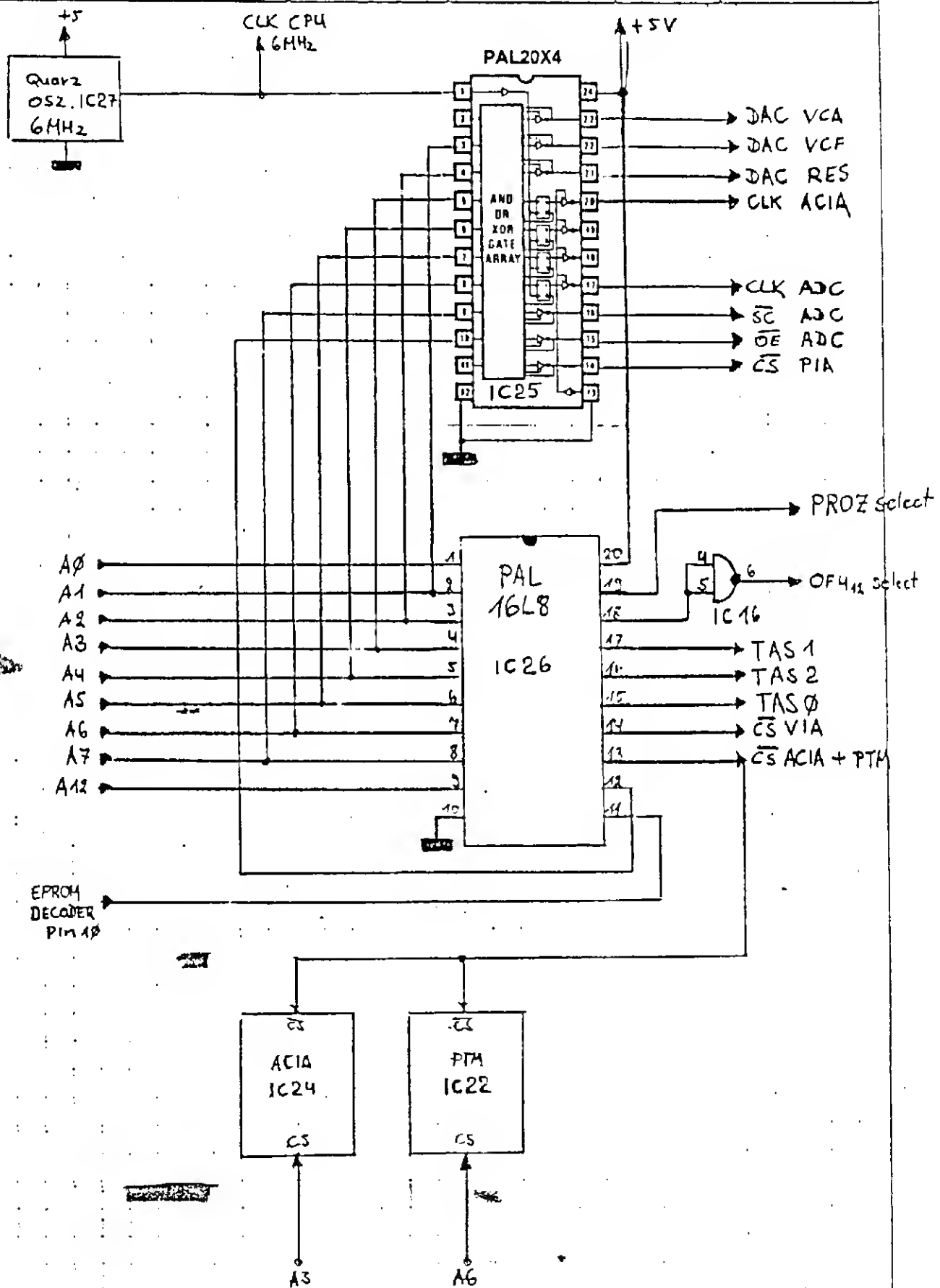


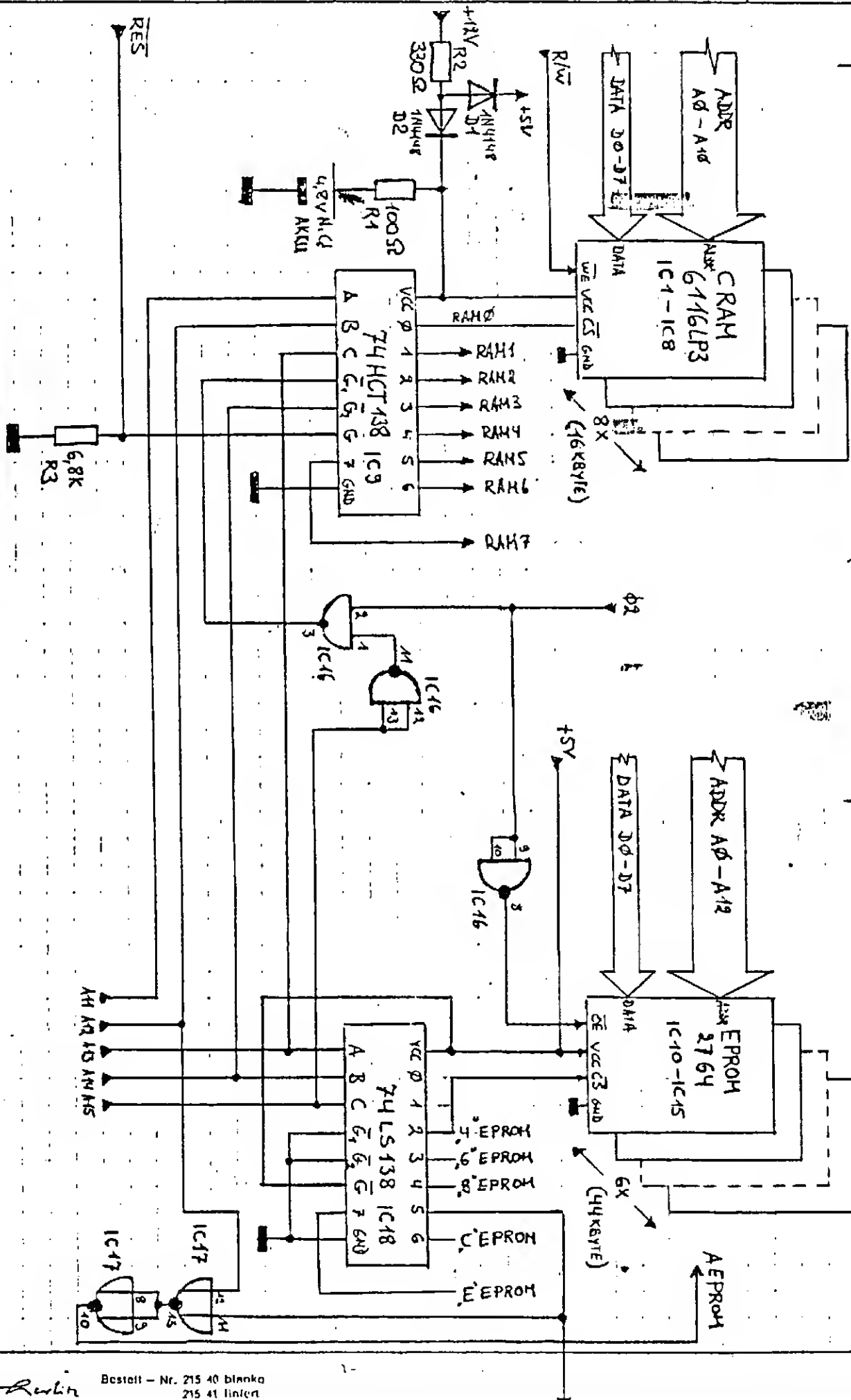
108109  
108101  
10522  
102 A-10

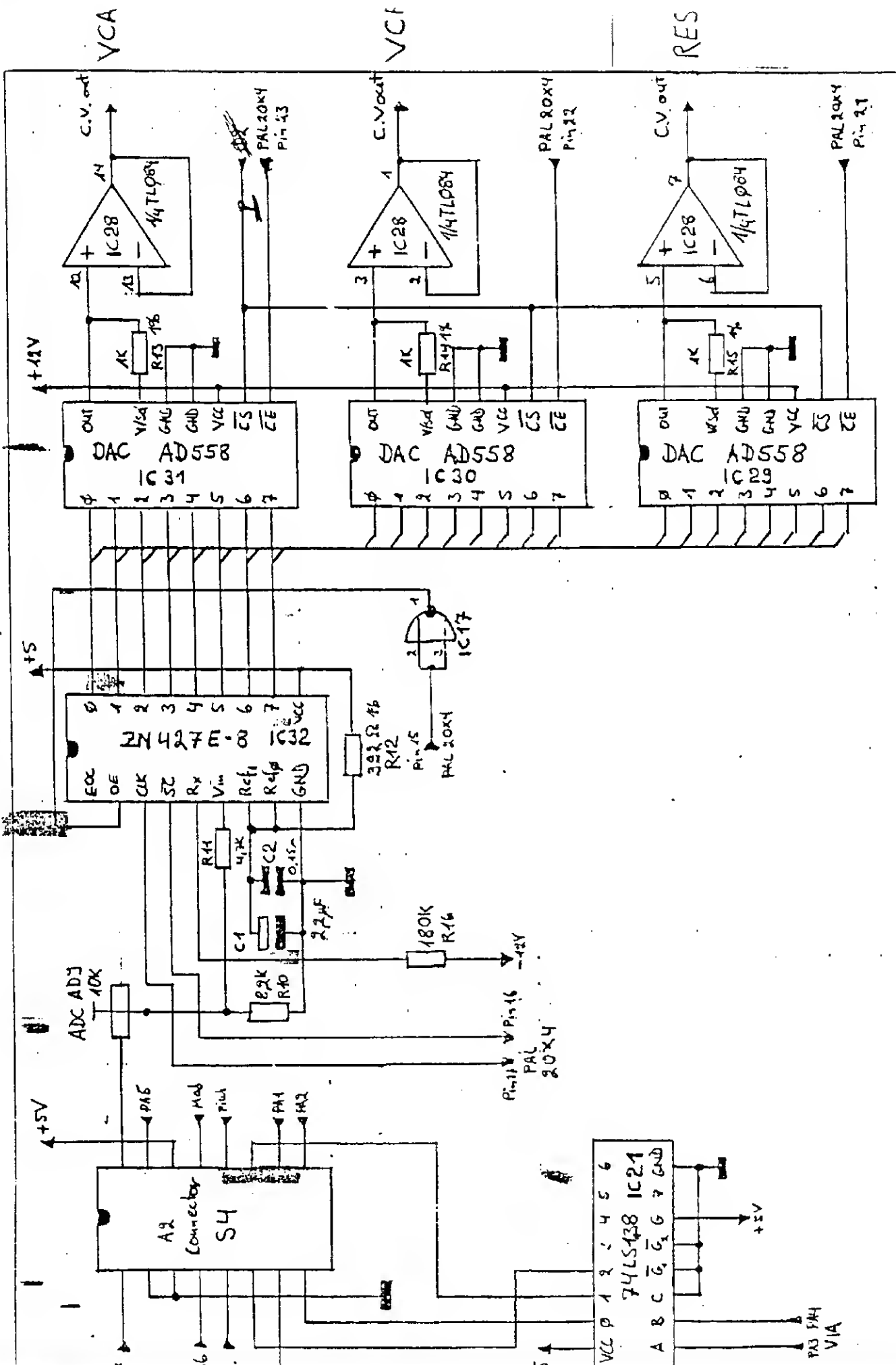










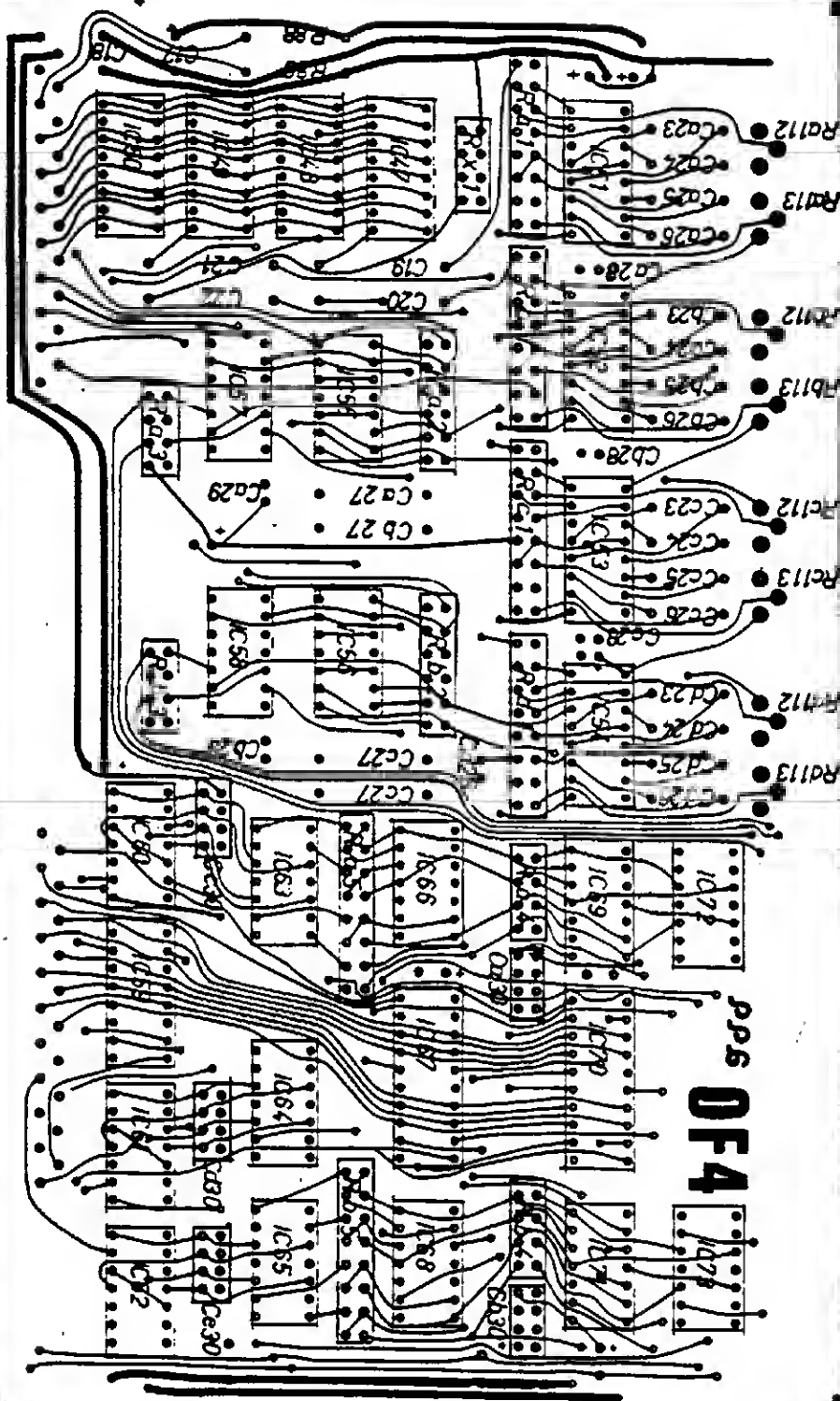


DAC and ADC 1/0 84 158D

Ra-d1=R90..R97  
 Rx1 =R98..R101  
 Ra-b2=R102..R107  
 Ra-b3=R108..R111

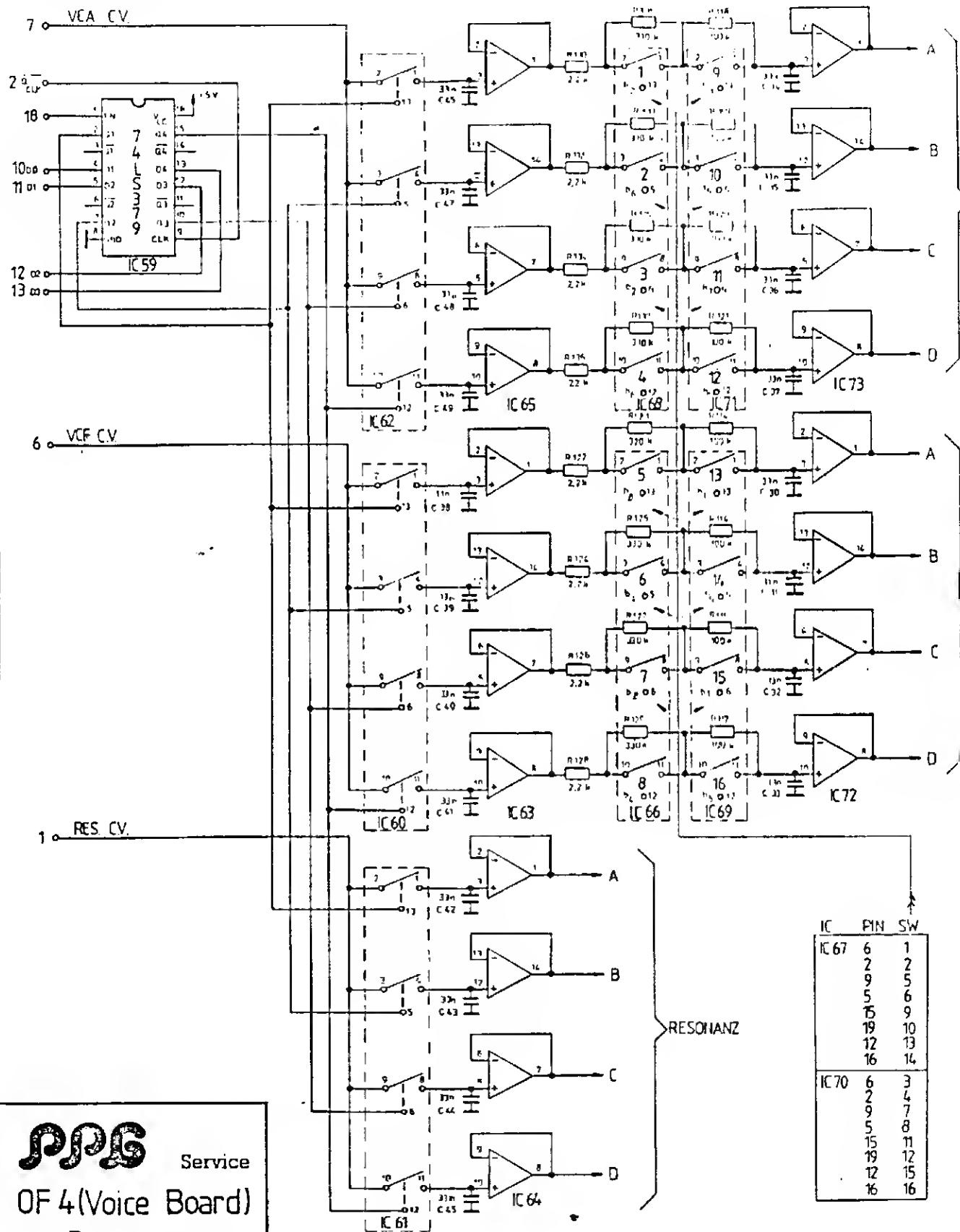
Ra4 = R114..R117  
 Ra5 = R118..R121  
 Ra5 = R122..R129  
 Ra5 = R130..R137

Ca30 = C30 - C33  
 Ca30 = C34 - C37  
 Ca30 = C38 - C41  
 Ca30 = C42 - C45  
 Ca30 = C46 - C49





OF4 CONN A



**PPG**

Service

OF 4(Voice Board)  
C.V. Processors

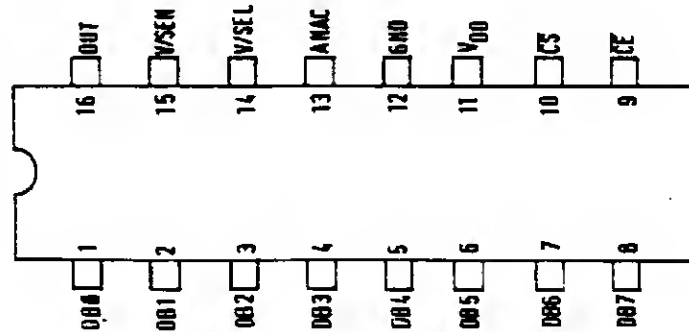
IC	PIN	SW
IC 67	6	1
	2	2
	9	5
	5	6
	15	9
	19	10
	12	13
IC 70	16	14
	6	3
	2	4
	9	7
	5	8
	15	11
	19	12
	12	15
	16	16



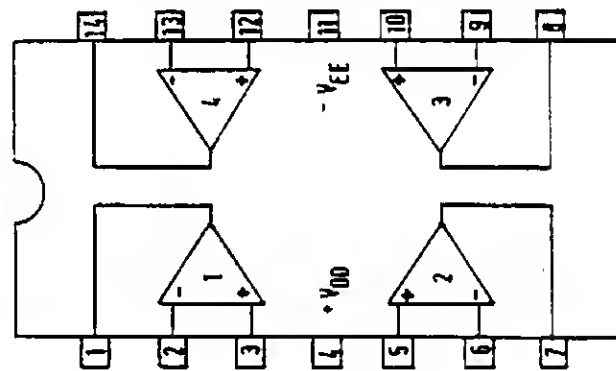
# SSM 2044



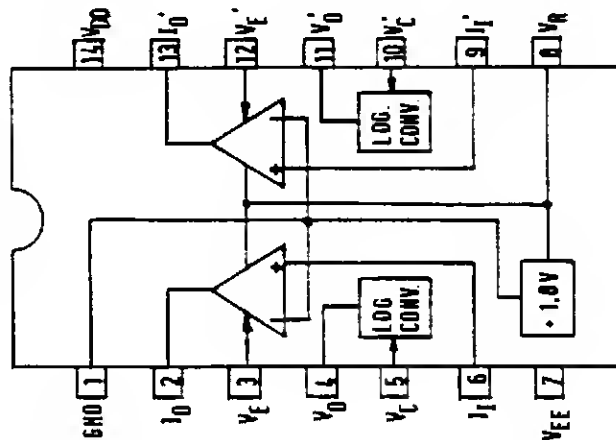
# AD558



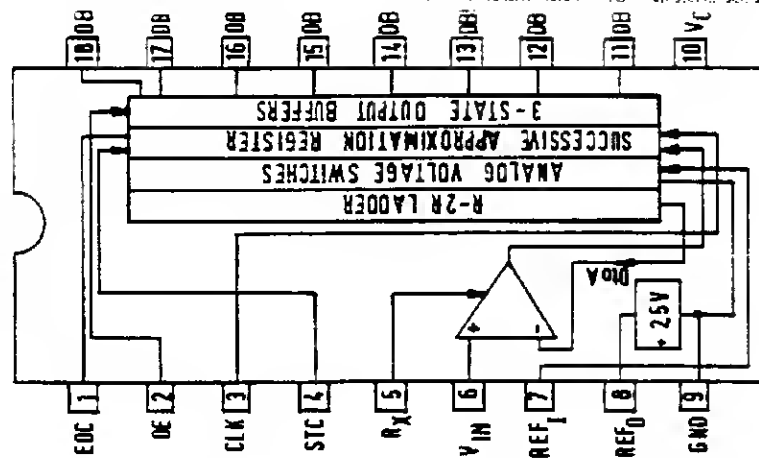
# TL084

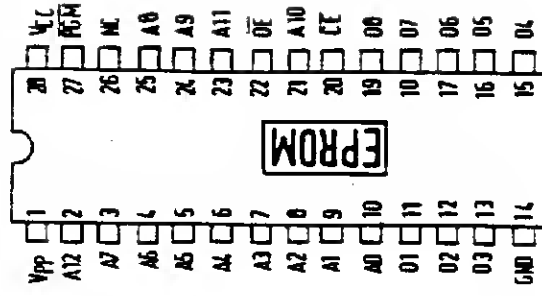
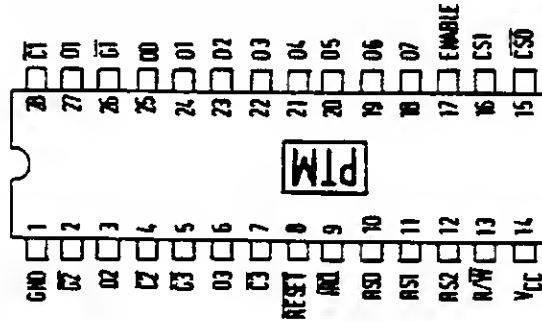
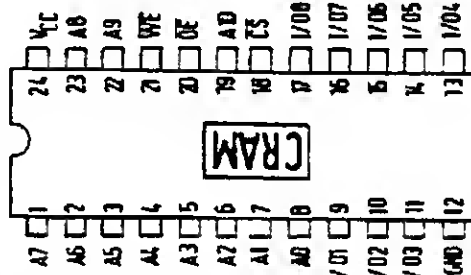
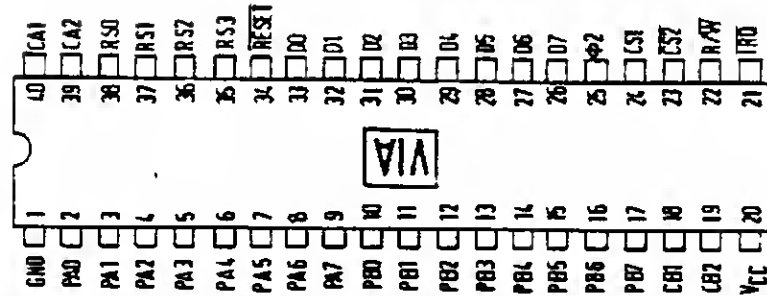
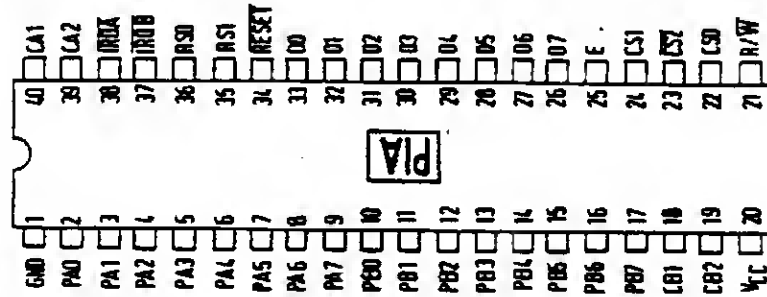
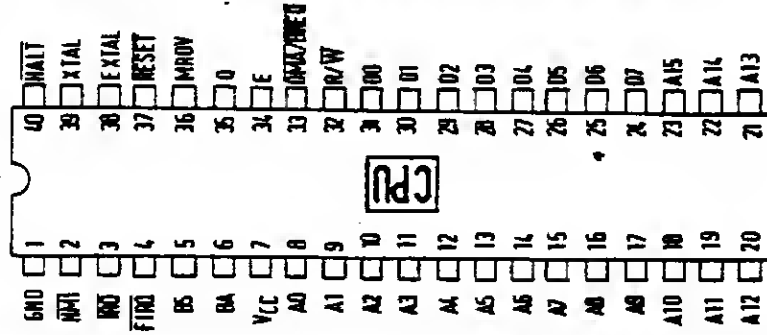
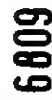


# CEM3360

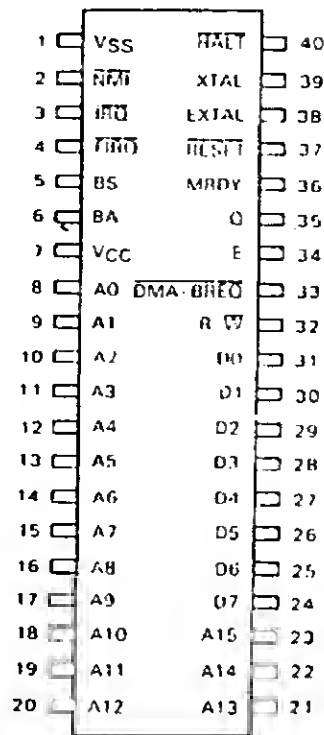


# ZNL427



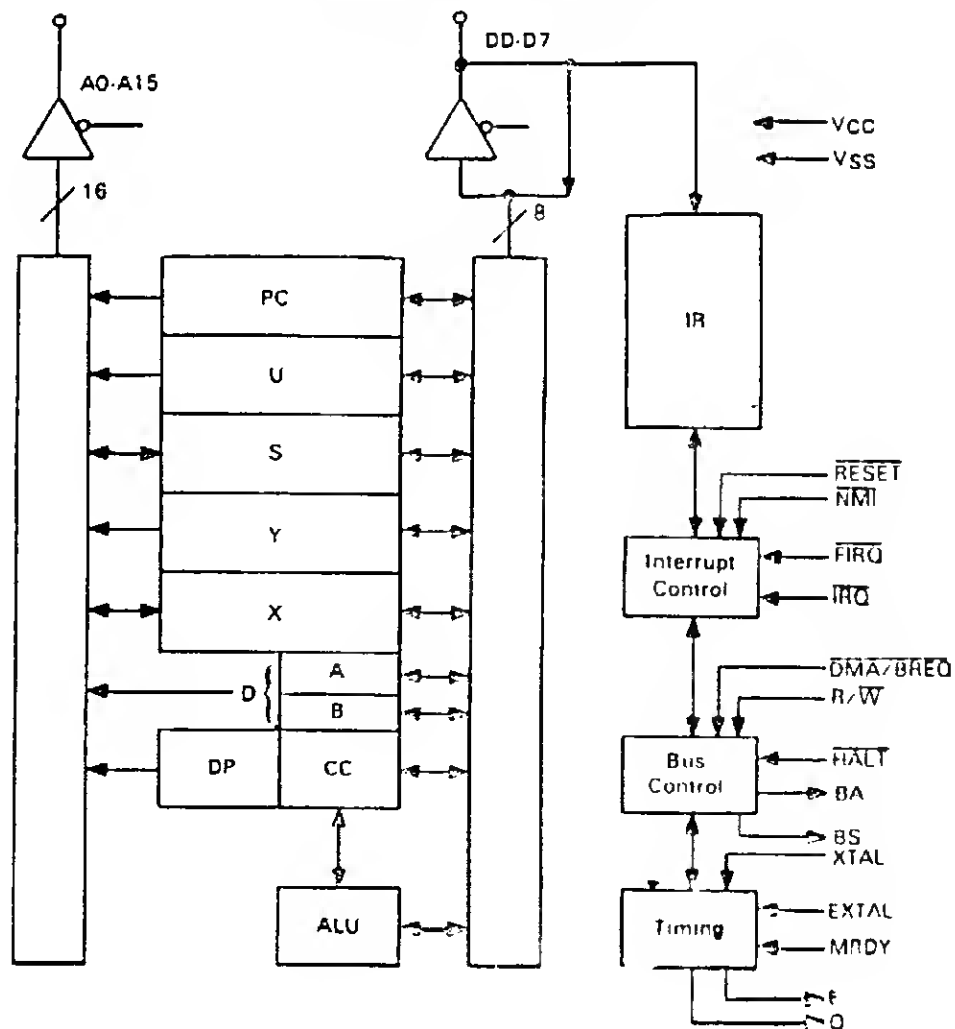


# PIN ASSIGNMENT

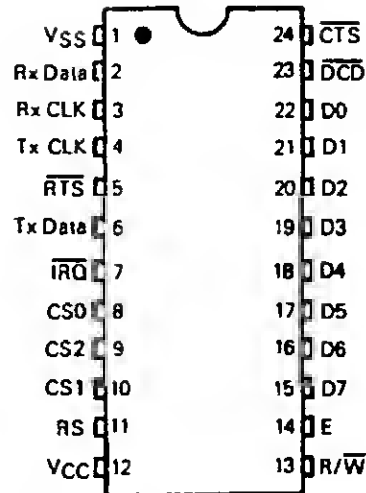


MC 68 A 09

## MC6809 EXPANDED BLOCK DIAGRAM

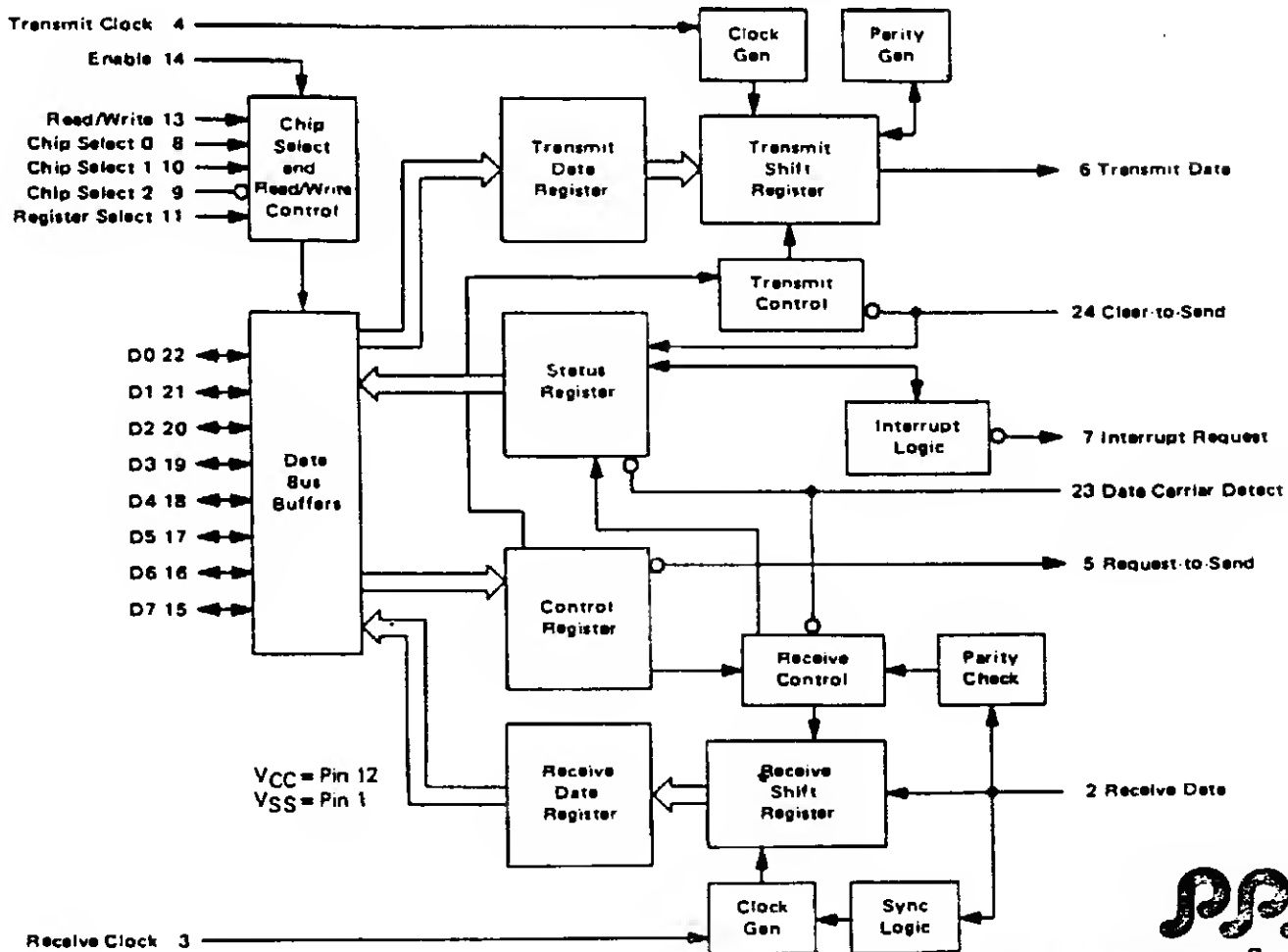


# PIN ASSIGNMENT

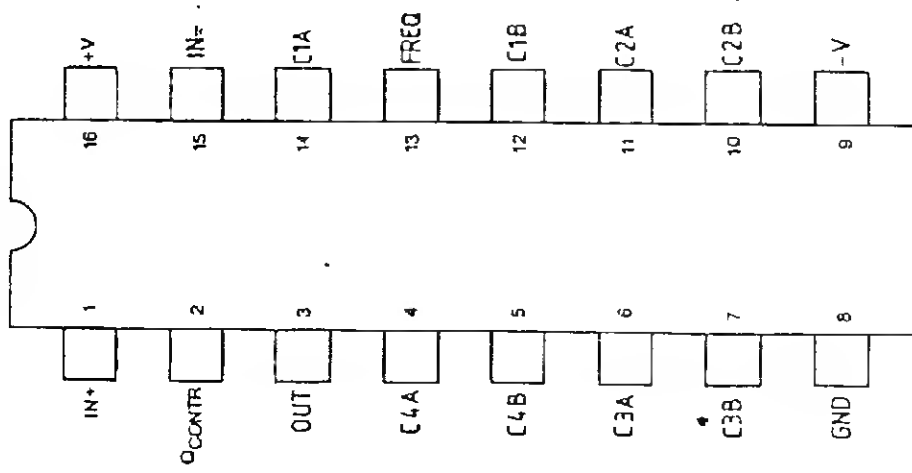


MC 68 A 50

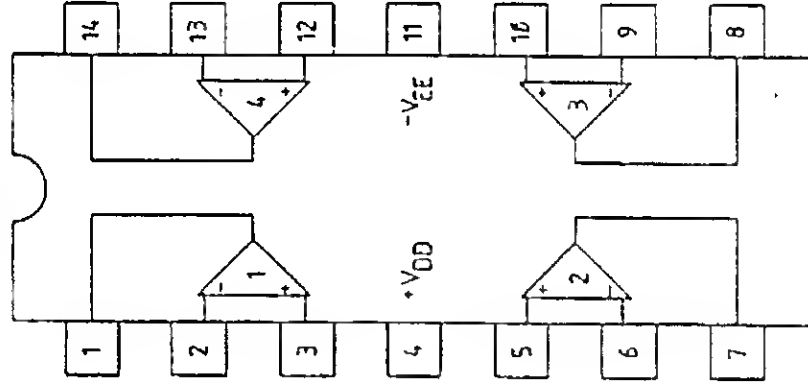
## EXPANDED BLOCK DIAGRAM



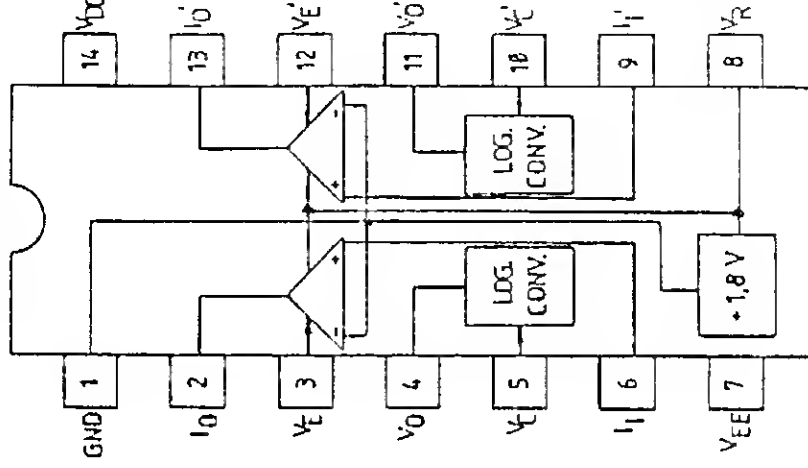
# SSM 2044



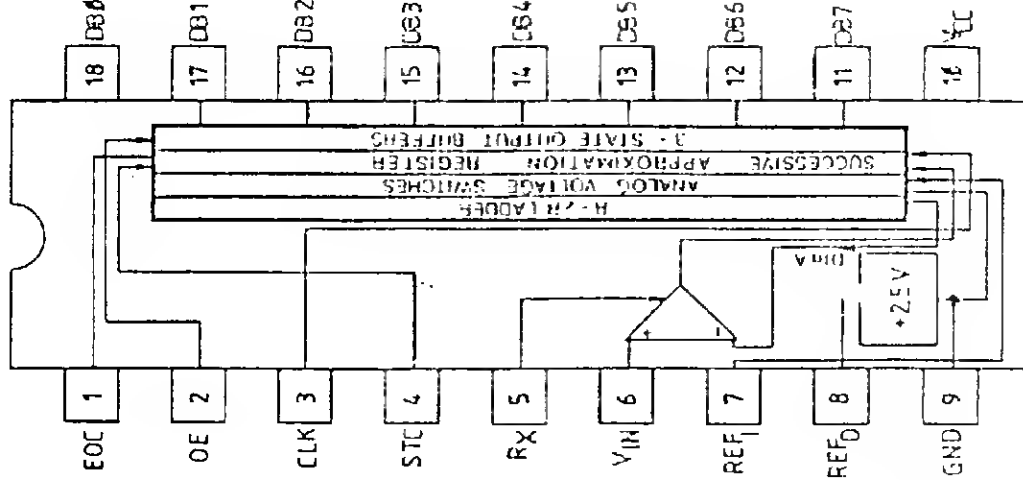
# TL 084



# CEM 3360



# ZH 427

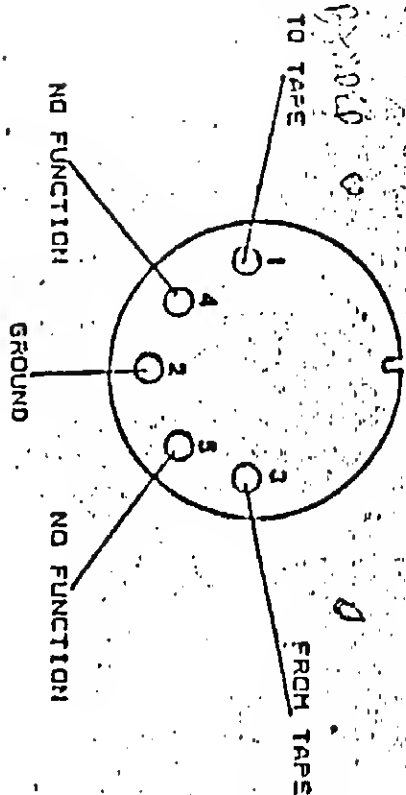


ANALOG PARTS

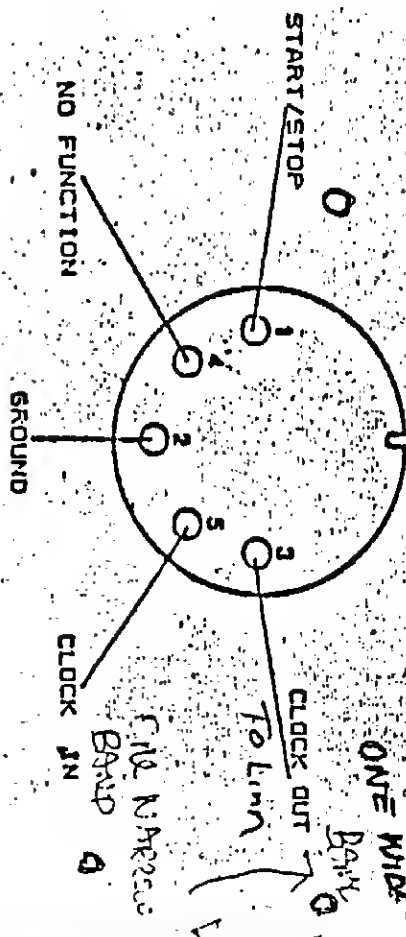
ppp

Service

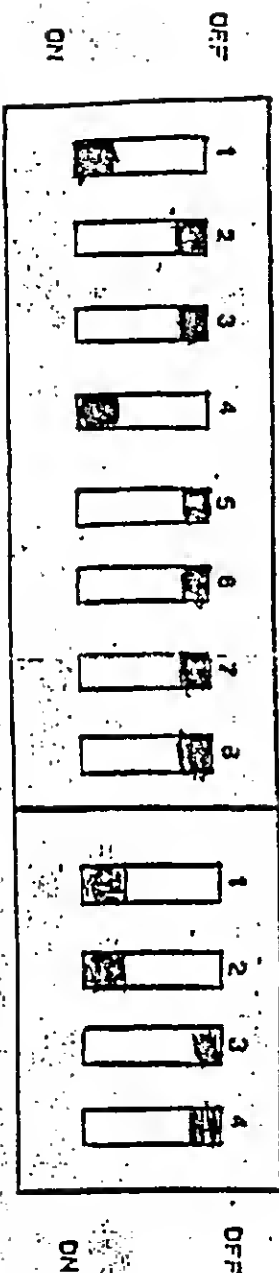
# CASSETTE INTERFACE DIN WIRING DIAGRAM



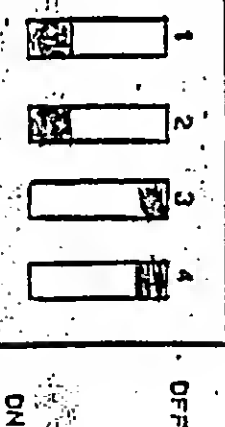
# CLOCK INTERFACE DIN WIRING DIAGRAM



## EIGHT SWITCH BOARD



## FOUR SWITCH BOARD



## CLOCK DIVIDER

Is Drive Data  
Line or

OSCAR clock

RING - OUT

TIP - IN

XLR

Hot 10-20 GND

3

GND

# PPG WAVE 2.2 OWNERS MANUAL

Take a look at the two switch blocks at the rear of the WAVE 2.2. The switches have the following positions and numbering of the switches:

8-Switch Block								4-Switch Block			
1	2	3	4	5	6	7	8	1	2	3	4

The reductions possible with the 8-Switch block are as follows:

Switch 1	Mother	clock	1 : 1	768
Switch 2	Mother	clock	1 : 3	256
Switch 3	"	clock	1 : 1	
Switch 4	"	clock	1 : 4	
Switch 5	"	clock	1 : 8	
Switch 6	"	clock	1 : 16	
Switch 7	"	clock	1 : 32	
Switch 8	"	clock	1 : 64	

NORMALLY  
 FOR SYNC TO TAPE 1:1 SWITCHES 1 & 3  
 FOR ROLAND OR UBERHEIM 1:8 SWITCHES 1 & 5  
 FOR 1:24 SWITCHES 2 & 5

SWITCH 1

2

3

4

FOR INTERNAL CLOCK

SWITCHES 1 & 2

FOR EXTERNAL CLOCK

SWITCHES 1 & 4

OR SYNC TO TAPE

3 & 4

TAPE MUST BE AMPLIFIED SO

CLOCK IS 4V p.p MINIMUM

FROM TAPE, ADJUST LEVEL TO POINT WHERE TRIGGERING BEGINS, THEN INCREASE LEVEL A LITTLE MORE,

**SERVICESET A**  
(single components)

**ORDER No. SC 100**

**Pots**

<b>Localisation / Function</b>		<b>Pcs.</b>	<b>Order No.</b>
Analog Panel board	1 k Ohm	3	AP - 001
Master Vol.	2x10 k Ohm	1	MV - 001
Basis	100 k Ohm	1	B - 001
Pitch Wheel		1	PW - 001
Mod. Wheel		1	MW - 001
Display Intens.	1 k Ohm	1	D - 001
Trimpot on I/O	10 k Ohm	1	A - IO - 8401
Trimpots OF board	10 k Ohm	4	OF 12 - 020
Display		1	DS - 100
Voltage Regulator for + 5 V 78H05		1	PS - 100
Capacitor for + 5 V 10000 uF/16 V		1	PS - 312

**Switches**

<b>Localisation/Funktion</b>	<b>Pcs.</b>	<b>Order No.</b>
Power On / Off	1	PS - 304
220 / 110 V	1	PS - 305
8 - block MB	1	MB - 010
4 - block MB	1	MB - 011
Digital Panel	1	DP - 010

**Convectors and Sockets**

<b>Localisation/Function</b>	<b>Pcs.</b>	<b>Order No.</b>
Din Spin Cass / Sync.	1	MB - 001
Klinke Mono	2	MB - 002
Klinke Stereo	1	MB - 003
Siemens sockets / plugs	Sets	
31 pol.	2	MB - 004
21 pol.	1	MB - 005
13 pol.	1	MB - 006
Accu on I/O	1	I/O - 8428



**Localisation/Function**

AP - IO	Pcs. 1	Order No. AP - 003
DP - IO	1	DP - 001
Keyboard - I/O	1	KB - 010
Midi - I/O	1	M - 010
8 outputs - MB	1	MB - 007

**Integrated Circuits****Localisation/Function**

PIA 68A21	Pcs. 2	Order No. 10 - 8420
VIA 6522	1	10 - 8423
RAM 5128-15	2	10 - 8408
ACIA 68A50	1	10 - 4824
AD Conv. AD 558	2	E - 10 - 8402
D/A Con. ZN427 E-8	1	A - 10 - 8404
PAL 20x4 (I/O board)	1	10 - 8425
PAL 16L8 (I/O board)	1	10 - 8426
DA Conv. 7545	2	OF 12 - 021
VCF SSM 2044	2	OF 12 - 023
Dual VCA CEM 3360	2	OF 12 - 024
Screwset	1	SRC - 100
Knopset	1	KS - 100
Internal Com. - Flatcable	1	ICF - 100

**SERVICESET B**  
(3 boards)**Localisation/Function**

I/O board	Pcs. 1	Order No. I/O 84 - 100
Proz. board	1	Proz. 84 - 100
OF 4 / 12 bit	1	OF 21 - 100

**Complete boards**  
(not included in the serviceset)

Motherboard MB 82	MB 82 - 100
Analog Panel board	AP - 100
Midi / 8 output board	MO - 100
Digital Panel board	DP - 100
Display Transformer board	PS - 333

## POWER SUPPLY PART LIST

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	Order No.
Mainfilter	PS - 301
Fuse 1 A	PS - 302
Fuse 0,5 A	PS - 303
On - Off Switch	PS - 304
220 V/110 V Switch	PS - 305
Transformer	PS - 306
Rectifier $\pm 12$ V	PS - 307
Capacitor 1000 $\mu$ F/40 V	PS - 308
Voltage Regulator 7812	PS - 309
Voltage Regulator 7912	PS - 310
Rectifier +5V	PS - 311
Capacitor 1000 $\mu$ F 16 V	PS - 312
Voltage Regulator 7805	PS - 313
Display Transformer	PS - 314
Complete +5V/Display	PS - 333
Transformer Board (including 7805)	

capacitor 1000  $\mu$ F 16 V

## PARTS LIST for "OF 4 12 bit"

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### VOICEBOARD

#### A.) CV — Processors

ORDER No.

Resistorpacks	(Dil-Pack):	
TRW 8305/222G	8x2.2 Kohm	OF 12—CV—001
TRW 8228/334G	8x330 Kohm	OF 12—CV—002
TRW 8345/104G	8x100 Kohm	OF 12—CV—003
1C 74 LS 379		OF 12—CV—004
1C 74 LS 377		OF 12—CV—005
1C CD 4066 B		OF 12—CV—006
1C TL 084		OF 12—CV—007

#### B.) DAC, VCA and VCF

Resistorpacks	8x680 ohm	OF 12—010
Resistorpacks	4x82 Kohm	OF 12—011
Resistorpacks	8x220 ohm	OF 12—012
Resistorpacks	4x2.2Kohm	OF 12—013
Resistorpacks	4x22 Kohm	OF 12—014
Resisitorpacks	4x12 Kohm	OF 12—015
Resisitorpacks	4x39 Kohm	OF 12—016
Resisitorpacks	4x470Kohm	OF 12—017
Resistorpack	(Dil Pack)	
TRW 8345/1046	8x100Kohm	OF 12—018
Resistor	866 ohm	OF 12—019
Trimpot	10 Kohm	OF 12—020
DAC AD 7545		OF 12—021
OP TL 084		OF 12—022
VCF SSM 2044		OF 12—023
Dual VCA CEM 3360		OF 12—024
Complete OF 4/12 bit Board		OF 12—100

## **PARTS LIST for I/O BOARD without ANALOG and ENVELOPE PARTS**

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Pos.	Typ	Order No.
IC 1 - IC 8	LH 5128 - 15	I/O - 8408
IC 9	CD74 HC138	I/O - 8409
IC 10 - IC 11	Wavetable E-Proms	I/O - 8411
IC 12 - IC 15	Operating-Sys E-Proms (last version)	I/O - 8415
IC 16	SN74 LS00N	I/O - 8416
IC 17	SN74 S02N	I/O - 8417
IC 18	SN74 LS138N	I/O - 8418
IC 19	EF68 A09P	I/O - 8419
IC 20	EF68 A21P	I/O - 8420
IC 22	EF68 A40	I/O - 8422
IC 23	SY 6522 A	I/O - 8423
IC 24	EF68 A50P	I/O - 8424
IC 25	PAL 20x4	I/O - 8425
IC 26	PAL 16L8	I/O - 8426
IC 27	Quarz Osz. 6MHz.	I/O - 8427
ACCU	4,8 V	I/O - 8428
R 17 - R24	Resistorpack 8x33K	I/O - 8429
Connect. A/B	31 pol.	I/O - 8430
Complete I/O BOARD		I/O - 84100

## **PARTS LIST for ANALOG PANEL CIRCUIT ON I/O BOARD 82**

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Trimpot	10 Kohm	ORDER No.
R	392 ohm 1%	A-10-8201
IC 4024 B		A-10-8202
IC 74 LS 00		A-10-8203
IC 74 LS 244		A-10-8204
ADC ZN 427 E-8		A-10-8205
		A-10-8206

### **PARTS LIST for ANALOG PANEL CIRCUIT**

		ORDER No.
Analog Panel Poti	1 Kohm	AP-001
IC 4051 B		AP-002
Flatcable AP to IO		AP-003
Complete Analog Panel Board		AP-100

### **PARTS LIST for ANALOG PANEL CIRCUIT ON I/O BOARD**

		ORDER No.
Trimpot	10 Kohm	A-IO-8401
R 12	392 ohm 1%	A-IO-8401
IC 74 LS 138		A-IO-8403
ADC ZN 427 E-8		A-IO-8404

### **PARTS LIST for ENVELOPE CONTROL ON I/O 84**

		ORDER No.
R 13, 14, 15	1 Kohm 1%	E-IO-8401
DAC AD 558		E-IO-8402
OP TL 084		E-I/O-8403